

METHOD OF AND APPARATUS FOR AUTOMATIC SORTING OF SHEETFORMED OBJECTS

Patent Number: WO9315006
 Publication date: 1993-08-05
 Inventor(s): SWARTZ PER GUNNAR (SE); MEJDAHL NILS JONNY (SE)
 Applicant(s): SWARTZ PER GUNNAR (SE); MEJDAHL NILS JONNY (SE)
 Requested Patent: ☐ WO9315006
 Application Number: WO1993SE00051 19930125
 Priority Number(s): SE19920000249 19920129
 IPC Classification: B65H5/24; B65H29/18; B65H29/66
 EC Classification: B65H29/66, B65H33/12
 Equivalents: AU3465993, DE69318544D, ☐ EP0624144 (WO9315006), B1, ☐ SE469798, ☐ SE9200249
 Cited Documents: US4810153; GB1424182; GB2025372

Abstract

The invention relates to sorting sheet-like objects (1) into bundled groups (2) in which the objects are advanced in rows. The method is mainly characterized by orientating the objects into a fishscale-like configuration in which the objects are inserted partially beneath a respective immediately preceding object, as seen in the direction of advancement, and stacking or bundling the objects (1) from beneath. The invention also relates to arrangement for carrying out the method.

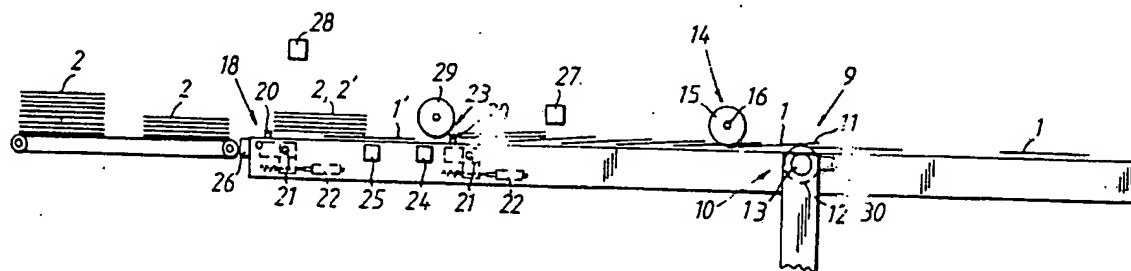
Data supplied from the esp@cenet database - I2



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁵ : B65H 5/24, 29/18, 29/66	A1	(11) International Publication Number: WO 93/15006 (43) International Publication Date: 5 August 1993 (05.08.93)
(21) International Application Number: PCT/SE93/00051 (22) International Filing Date: 25 January 1993 (25.01.93) (30) Priority data: 9200249-2 29 January 1992 (29.01.92) SE (71)(72) Applicants and Inventors: MEJDAHL, Nils, Jonny [SE/SE]; Frihetsvägen 15, S-131 47 Nacka (SE). SWARTZ, Per, Gunnar [SE/SE]; Dunungavägen 11, S-131 47 Nacka (SE). (74) Agents: BROLIN, Tommy et al.: Brolin & Sedvall Patentbyrå AB, Box 7182, S-103 88 Stockholm (SE).		(81) Designated States: AT, AU, BB, BG, BR, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG). Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

(54) Title: METHOD OF AND APPARATUS FOR AUTOMATIC SORTING OF SHEETFORMED OBJECTS

**(57) Abstract**

The invention relates to sorting sheet-like objects (1) into bundled groups (2) in which the objects are advanced in rows. The method is mainly characterized by orientating the objects into a fishscale-like configuration in which the objects are inserted partially beneath a respective immediately preceding object, as seen in the direction of advancement, and stacking or bundling the objects (1) from beneath. The invention also relates to arrangement for carrying out the method.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FR	France	MR	Mauritania
AU	Australia	GA	Gabon	MW	Malawi
BB	Barbados	GB	United Kingdom	NL	Netherlands
BE	Belgium	GN	Guinea	NO	Norway
BF	Burkina Faso	GR	Greece	NZ	New Zealand
BG	Bulgaria	HU	Hungary	PL	Poland
BJ	Benin	IE	Ireland	PT	Portugal
BR	Brazil	IT	Italy	RO	Romania
CA	Canada	JP	Japan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SK	Slovak Republic
CI	Côte d'Ivoire	LJ	Liechtenstein	SN	Senegal
CM	Cameroon	LK	Sri Lanka	SU	Soviet Union
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	MC	Monaco	TG	Togo
DE	Germany	MG	Madagascar	UA	Ukraine
DK	Denmark	ML	Mali	US	United States of America
ES	Spain	MN	Mongolia	VN	Viet Nam
FI	Finland				

Method of and apparatus for automatic sorting of
sheetformed objects

5 The present invention relates to a method of automati-
cally sorting sheet-like objects into bundled groups, in
which the objects are advanced in rows. The invention is
intended for application when sorting, among other
things, computer printouts, both in a folded and non-
folded state, envelopes, so-called mailers, etc.

10 The invention also relates to arrangement for carrying
out the method.

15 Methods and arrangement of this general kind are known
to the art. According to one known technique, the ob-
jects are delivered to a row of mutually sequential
bundling or stacking stations, in which the objects are
bundled on a raisable and lowerable bottom device at
respective locations, and wherein bundled objects are
20 placed on conveyors which move along the rows of bun-
dling stations and later removed therefrom. This known
technique is encumbered with a number of serious draw-
backs. For instance, the arrangement of rows of bundling
stations and a conveyor which is common to all said
25 stations places serious restrictions on the speed at
which the objects can be sorted, while requiring the use
of an intricate control system.

30 The present invention provides a method and an arrange-
ment which enables the objects to be sorted very quickly
and which include significant simplifications in compar-
ison with the known methods and arrangements of the kind
meant here.

35 Thus, the invention relates to a method of sorting
sheet-like objects into bundled groups, in which the

objects are advanced in rows.

5 The method is mainly characterized by arranging the objects in a fishscale-like configuration in which each object is partially overlapped by an immediately preceding object, as seen in the direction of advancement, and stacking the objects together from beneath.

10 The invention also relates to an arrangement for sorting sheet-like objects into bundled groups which include conveyor means for advancing the objects in rows.

15 The arrangement is mainly characterized by devices which are active in placing the objects in a fishscale-like configuration, in which each objects is partially overlapped by an immediately preceding object as seen in the direction of advancement, and by devices which are active in stacking the objects from beneath.

20 The invention will now be described in more detail with reference to exemplifying embodiments thereof and also with reference to the accompanying drawing, in which

25 Figure 1 is a schematic overhead view of a first embodiment of an inventive arrangement, in which the objects are moved from the right to the left in the Figure, and in which Figure no objects have been shown for the sake of clarity; and

30 Figure 2 illustrates the arrangement shown in Figure 1 from beneath the arrangement.

35 Figure 1 shows sheet-like objects 1 which are intended to be sorted by the inventive arrangement into bundles 2 in a predetermined fashion. The arrangement includes primarily an object aligning and conveying section 3 and

an object grouping section 4.

5 The objects can be introduced into the object aligning and conveying section 3 from the front of said section, i.e. in the main object conveying direction of the arrangement, as indicated by an arrow 5 in Figure 1, or from the side of said section, as indicated by an arrow 6 in Figure 1. The objects are brought into edge-alignment with one another in the aligning section 3
10 against a side bar 7 with the aid of an obliquely positioned feeder 8, such as a belt 8, and advanced in said section towards the object grouping section 4.

15 The grouping section 4 is constructed to orientate the objects 1 in a fishscale-like configuration at that end of the section which faces towards the aligning and conveying section, such that the objects will be partially overlapped by a respective preceding object, as seen in the direction of advancement. According to one preferred
20 embodiment, the arrangement includes a braking and lifting device 10 which is passed by the objects and which functions to brake respective objects and to raise the rear part 11 of said objects, so that the immediately following object will be partially overlapped by the
25 braked and raised preceding object, as illustrated schematically in Figure 2. In the case of the illustrated, exemplifying embodiment, the lifting and braking device includes roller means 12, which in the Figure 1 embodiment have the form of disc-shaped rollers 12 which
30 rotate about an axle 13 which extends transversely to the direction in which the objects are advanced such as to lift said objects, and also braking means 14 in the form of roller means 15, which in the illustrated case have the form of disc-shaped rollers 15 which rotate
35 about an axle 16 which extends transversely to the direction in which the objects are advanced and which

functions to slow down the objects in their respective raised positions, so that the next following object will be partially inserted beneath the immediately preceding object. The brake means or object retarding means 14 can
5 be adjusted in the conveying direction, so as to adapt to the current sizes of the objects, as indicated by the double-headed arrow 17 in Figure 1.

The illustrated arrangement also includes a stacking or
10 bundling device 18 which functions to stop the fish-scale-configured stream of objects so as to form a bundle 2, as a result of following objects being continuously inserted beneath preceding objects which have been stopped by the stacking device 18 and therewith
15 form a stack or bundle of objects, as shown schematically in Figure 2. In the case of the illustrated, preferred embodiment, the stacking device includes a forked member 19 which is provided with upwardly turned stop shoulders 20 against which the objects are intended to be stopped. The forked member 19 is pivotal about an
20 axle 21 which extends transversely to the object conveying direction and which is intended to be held in a stop position by means of a spring force, and which is rotated counter-clockwise in Figure 2 against said spring
25 force by means of an electromagnetic pulling device 22, wherein the stop shoulders are intended to be lowered so that the objects/bundles that are stopped by the stop shoulders can be released for further transportation.

30 As will be seen from the drawing, the arrangement includes a grouping device 23 which is located upstream of the stacking device and which functions to stop the flow of mutually overlapping objects so as to create an interruption in the flow upstream of said stacking
35 device, this interruption being intended to delimit two mutually sequential groups of objects, as shown schemat-

ically in Figure 2.

The grouping device includes a forked member 19 of the same kind as that included in the stacking device for
5 stopping and releasing objects.

The illustrated arrangement also includes a first sensor
24 which detects the last object 1' that is allowed
through by the grouping device prior to an interruption
10 and which also sends to the grouping device a signal instructing the device to release the stream of objects.
The arrangement also includes a second sensor which
detects the last object 1' to be allowed to pass through
and also functions to send to the stacking device a
15 signal instructing said device to release the bundle 2'
in which the object 1' is at the bottom of the bundle.
The arrangement also includes a third sensor 26 which
detects when the bundle 2' has been released from the
stacking device and has left the device, and functions
20 to send to the stacking device a signal which causes the
stream of objects to be stopped and a further bundle
formed.

The grouping device is constructed to be activated in a
25 manner to cause an interruption in the stream of objects
in receipt of a signal sent from a sign reader 27 which
is located upstream of the grouping device and which
functions to distinguish between the different objects
in the object stream by means of distinguishing marks on
30 said objects and/or by means of a height detecting means
28 which functions to detect the height of a bundle
formed in the vicinity of the stacking device.

The aforesaid last object 1' which is allowed to pass
35 through is drawn past the grouping device by means of
rollers 29.

A fourth sensor 30 is provided in the vicinity of the object braking and lifting device and functions to detect errors in the fishscale-like configuration of the objects and to send a signal to the grouping device
5 instructing said device to stop the stream of objects when such a fault is detected.

The reference numeral 31 identifies belts which form part of a grouping section conveyor 32, which is active
10 to draw, convey, the objects through the grouping section.

The method according to the present invention and also the manner of operation of the inventive arrangement
15 will be understood in all essentials from the foregoing. Thus, subsequent to the objects being brought into edge-alignment, the objects are arranged in a fishscale-like configuration and stacked together from beneath in the stacking device, in which the objects are
20 stopped. The stream of mutually overlapping objects is divided by the grouping device into bundles which correspond to different groups or classes of objects.

It will also be understood that the invention enables
25 objects to be sorted quickly and reliably. The invention has been described in the foregoing with reference to mainly one embodiment thereof. It will be understood, however, that other embodiments and minor modifications are conceivable, without departing from the inventive
30 concept.

The devices 24, 25, 30, 26, 27, 28 for detecting objects, bundles, distinguishing between the different objects and for detecting the heights of the bundles are
35 suitably of a known kind.

According to one preferred embodiment of the invention, the sign reader 27 is an optical reader, for instance a black/white reader, for contactless detection and identification of signs or markings on the objects and/or
5 for counting the objects.

Similarly, according to one preferred embodiment of the invention, the sensors 24, 25, 26 and 30 include photo-readers which detect reflected light and therewith
10 detect whether or not an object is located in the position monitored by a respective sensor.

The height detector 28 will preferably include level sensors which function to detect bundle height, and
15 particularly when a predetermined bundle height has been reached, said level sensors being arranged essentially transversely to the height direction of the bundle 2'. The level sensor 28 may also be of a kind which includes distance measuring means active in measuring the dis-
20 tance to the upper surface of the bundle 2'.

The inventive arrangement may include a more or less intricate control system, not shown. In the case of the
25 aforescribed embodiment, it is possible to avoid the need for a main or supervisory control system, since the different sensors are able to control the process of sorting the objects into respective bundles and groups in an unequivocal manner. The control system may, in the present respect, include devices which enable the divi-
30 sion of the objects into groups in response to a signal delivered by a level sensor 28 or a sign reader 27, or by both in combination. A more active control system can also be envisaged, in which the conveying speed of the conveyor 32 is detected by means of a pulse disc or in
35 some other suitable known manner, and in which, among other things, predetermined delays are introduced while

taking the conveyor speed into account, so as to achieve the aforescribed working method of the arrangement.

5 As will be understood from the foregoing, one sorting criterion with regard to the division of bundled groups can be the type of object concerned, so that different types of objects will be sorted into respective different bundles and/or the division can be effected in accordance with the height of the bundles, so that the
10 objects will be sorted into bundles of predetermined heights. Another sorting criterion which can be used separately or in combination with one or more of the other criteria may be the number of objects concerned.

15 The invention is thus not restricted to the described and illustrated embodiments, since variations can be made within the scope of the following Claims.

Claims

1. A method for sorting sheet-like objects into bundled groups, in which the objects are advanced in rows, c h a r a c t e r i z e d by arranging the objects in a fishscale-like configuration in which a following object is partially inserted beneath a respective preceding object as seen in the direction of advancement, and by stacking the thus orientated objects from beneath.
2. A method according to Claim 1, c h a r a c t e r i z e d by passing the row of objects through a lifting device (12, 13) which functions to hold the rear part (11) of respective objects in a raised position while the next following object is inserted partially beneath the lifted part of the immediately preceding object.
3. A method according to Claim 1 or 2, c h a r a c t e r i z e d by halting the stream of mutually overlapping objects with the aid of a stacking device (18), and forming a bundle of objects (2, 2') by continuously inserting objects beneath preceding stationary objects, to form a bundle or stack.
4. A method according to Claim 1, 2 or 3, c h a r a c t e r i z e d by releasing a bundle (2, 2') containing a predetermined number of objects through the agency of the stacking device, and transporting said bundle away.
5. A method according to Claim 1, 2, 3 or 4, c h a r a c t e r i z e d by halting the flow of partially overlapping objects with the aid of a grouping device (23), such as to interrupt the flow of objects,

this interruption mutually separating two mutually sequential groups of objects.

5 6. A method according to Claim 5, c h a r a c -
t e r i z e d by detecting the last object (1') that
the grouping device allows to pass through prior to an
interruption, wherein the stream of objects is released
by means of the grouping device when said last object
has passed a predetermined position between the stacking
10 device and the grouping device; and by releasing the
bundle (2') in which said object forms the bottommost
object, through the agency of the stacking device,
whereafter the object stream is again halted by means of
the stacking device.

15 7. A method according to Claim 1, 2, 3, 4, 5 or 6,
c h a r a c t e r i z e d by activating the grouping
device to cause an interruption in the object stream in
response to a signal delivered by a sign reader (27)
20 which is located upstream of the grouping device and
which functions to detect the nature of the objects in
the object stream and/or count said objects (1), and/or
delivered by a height detector (28) which functions to
detect the height of a bundle formed in the vicinity of
25 the stacking device.

8. A method according to Claim 1, 2, 3, 4, 5, 6 or 7,
c h a r a c t e r i z e d by halting the stream of
objects to the grouping device when a fault is detected
30 in the fishscale-like configuration of the objects.

9. A method according to Claim 1, 2, 3, 4, 5, 6, 7 or
8, c h a r a c t e r i z e d by bringing the objects
into edge-alignment against a side bar (7) with the aid
35 of an obliquely positioned feeder (8) prior to arranging
the objects in said fishscale-like configuration.

10. An arrangement for sorting sheet-like objects into bundled groups, comprising conveyor means for advancing the objects in rows, c h a r a c t e r i z e d by devices (10, 14, 18) which are active in arranging the objects (1) into a fishscale-like configuration in which an object is partially inserted beneath an immediately preceding object as seen in the direction of advancement and thereafter stacking the objects from beneath.
11. An arrangement according to Claim 10, c h a r a c t e r i z e d by a braking and lifting device (10) which is intended to be passed by said objects and which is active in holding the rear part (11) of respective objects in a raised position while part of an immediately following object is inserted beneath the raised preceding object.
12. An arrangement according to Claim 11, c h a r a c t e r i z e d in that the braking and lifting device (10) includes roller means (12) which are rotatable about an axle (13) which extends transversely to the direction in which the objects are advanced, so as to raise said objects.
13. An arrangement according to Claim 10 or 11, c h a r a c t e r i z e d in that the braking and lifting device (10) includes braking means (15) preferably in the form of roller means (15) which are rotatable about an axle (16) which extends transversely to the direction of advancement of the objects and which functions to halt objects in a partially raised position effected by said lifting device, so that the next arriving object will be inserted partially beneath the immediately preceding object.

14. An arrangement according to Claim 10, 11, 12 or 13,
c h a r a c t e r i z e d by a stacking device (18)
which is active to halt the stream of fishscale-like
configured objects, such that a continuous stream of
5 objects will be inserted beneath the preceding, station-
ary objects to form a bundle (2, 2').

15. An arrangement according to Claim 14,
c h a r a c t e r i z e d by devices (19, 20, 21, 22)
10 which function to release a bundle of predetermined size
formed by said stacking device (18), and to carry away
said bundle.

16. An arrangement according to Claim 14 or 15,
15 c h a r a c t e r i z e d by a grouping device (23)
which is active to halt the stream of fishscale-like
configured objects so as to create an interruption in
said stream upstream of the stacking device (18), said
interruption being intended to delimit two mutually
20 sequential groups of objects.

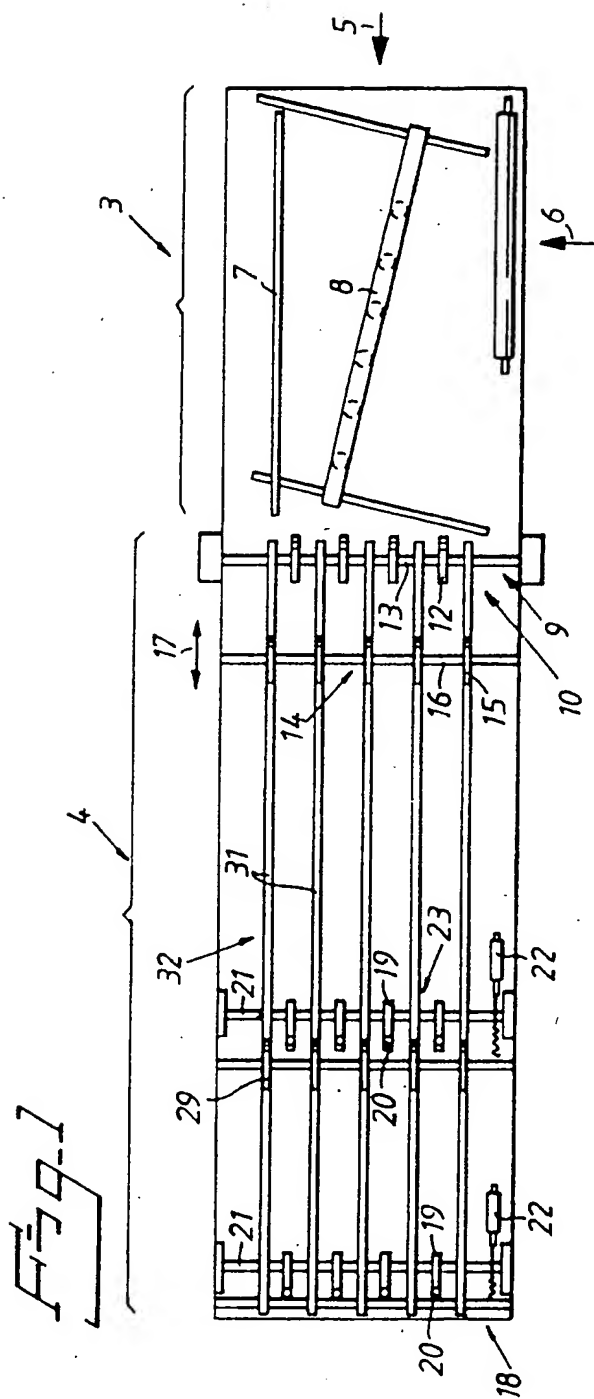
17. An arrangement according to Claim 16,
c h a r a c t e r i z e d by sensor means (24, 25, 26)
which function to detect the last object (1') which is
25 allowed to pass by the grouping device prior to an
interruption and to deliver a signal to the stacking
device for releasing the bundle (2') in which the last
object (1') forms the bottommost object, and to deliver
a signal to the grouping device to release the stream of
30 objects when said last object has passed a predetermined
position between the stacking device and the grouping
device, and to deliver a signal to the stacking device
instructing said device to again halt the flow of ob-
jects so as to form a new bundle.

18. An arrangement according to Claim 16 or 17,
c h a r a c t e r i z e d in that the grouping device
is intended to be activated to create an interruption in
the object stream in response to a signal from a sign
5 reader (27) located upstream of the grouping device and
functioning to detect the nature of the objects in said
stream and/or to count said objects with the aid of
signs or markings on the objects and/or in response to a
signal delivered by a height sensor (28) which functions
10 to detect the height of a bundle formed in the vicinity
of the stacking device.

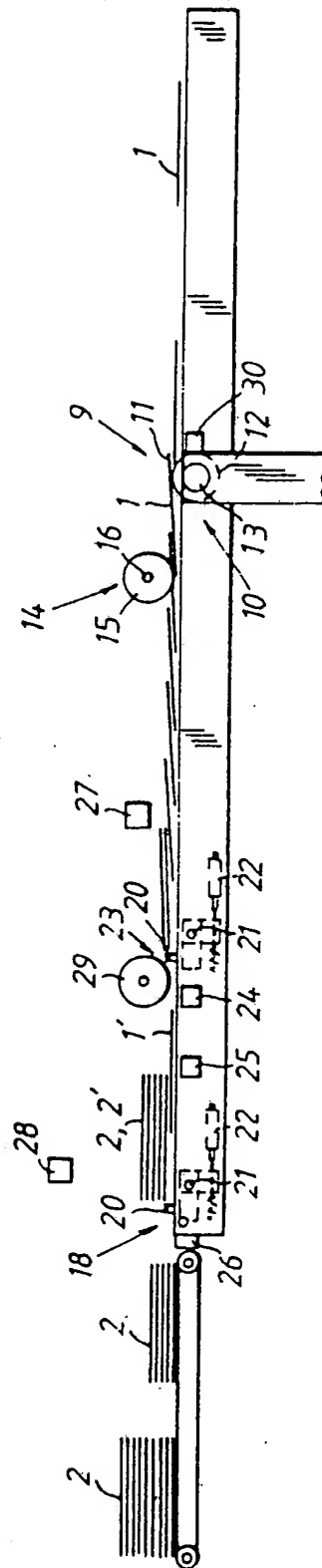
19. An arrangement according to Claim 16, 17 or 18,
c h a r a c t e r i z e d by devices (30) which func-
15 tion to detect a fault in the fishscale-like configura-
tion of the objects and to stop the stream of objects to
the grouping device when such a fault is detected.

20. An arrangement according to Claim 10, 11, 12, 13,
20 14, 15, 16, 17, 18 or 19, c h a r a c t e r i z e d by
an obliquely positioned feeder (8) which functions to
bring the objects into edge-alignment against a side bar
(7) prior to orientating said objects in said fishscale-
like configuration.

1 / 1



2-7-9-2



SUBSTITUTE SHEET

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 93/00051

A. CLASSIFICATION OF SUBJECT MATTER

IPC5: B65H 5/24, B65H 29/18, B65H 29/66

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC5: B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4810153 (M. ARMELIN), 7 March 1989 (07.03.89), column 3 - column 6, figures 1-4	1,10
Y	--	2-9,11-20
X	GB, A, 1424182 (PACKOTOM B.V.), 11 February 1976 (11.02.76), page 3, line 49 - line 80, figures 1-4	1,10
Y	--	2-9,11-20
Y	GB, A, 2025372 (THE HAMILTON TOOL COMPANY), 23 January 1980 (23.01.80), figure 1	2-9,11-20

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"B" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

1 April 1993

Date of mailing of the international search report

04 -05- 1993

Name and mailing address of the ISA/

Swedish Patent Office

Box 5055, S-102 42 STOCKHOLM

Facsimile No. +46 8 666 02 86

Authorized officer

Kjell Lundahl

Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

Information on patent family members

26/02/93

International application No.

PCT/SE 93/00051

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US-A-	4810153	07/03/89	EP-A,B-	0244308	04/11/87
GB-A-	1424182	11/02/76	DE-A-	2434360	20/03/75
			FR-A-	2243897	11/04/75
			JP-A-	50055066	15/05/75
			NL-A-	7312656	17/03/75
			SE-A-	7409369	14/03/75
GB-A-	2025372	23/01/80	CA-A-	1089889	18/11/80
			DE-A-	2909831	17/01/80
			JP-A-	55007176	18/01/80
			US-A-	4270743	02/06/81